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107. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy, Irving College, Mechanicsburg, Pa.

The speed of signaling in submarine telegraph-cable varies as  $x^2 \log(1/x)$ , in which  $x$  is the ratio of the radius of the core to that of the covering. Prove that the *maximum speed* is attained when this ratio is  $1:\sqrt{e}$ .

\*\*\* Solutions of these problems should be sent to J. M. Colaw not later than March 10.

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### MECHANICS.

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101. Proposed by ALOIS F. KOVARIK, Instructor in Mathematics and Science, Decorah Institute, Decorah, Iowa.

Find the center of gravity of a cone that has a specific gravity of 1 (one) at the top and 2 (two) at the base.

102. Proposed by WALTER H. DRANE, Graduate Student, Harvard University, Cambridge, Mass.

A heavy particle with a light string attached is placed on the edge of a smooth table. A boy, holding the string horizontally, runs at right angles to the string. Determine the motion of the particle (1) when the boy runs with a uniform velocity; (2) when he runs with a uniform acceleration.

\*\*\* Solutions of these problems should be sent to B. F. Finkel not later than March 10.

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### DIOPHANTINE ANALYSIS.

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83. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

Find three numbers in arithmetical progression whose sum is a square and cube.

84. Proposed by SYLVESTER ROBINS, North Branch Depot, N. J.

The  $n$ th term of an infinite series of "nests" contains all the prime, integral; rational parallelopipeds that have  $3^n$  for their solid diagonals. It is required to determine the general expression for  $N$ =the number of such solids in  $n$ th term, and to exhibit the dimensions of all the "eggs" in the first six nests.

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### AVERAGE AND PROBABILITY.

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88. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

Find the average volume of the tetrahedron formed by joining four random points in a sphere.

89. Proposed by B. F. FINKEL, A.M., M. Sc., Professor of Mathematics and Physics, Drury College, Springfield, Mo.

An inch auger-hole is bored at random through a six-inch sphere. Find the average volume of the auger-hole.

90. Proposed by WALTER H. DRANE, Graduate Student, Harvard University, Cambridge, Mass.

During a heavy rain storm a circular pond is formed in a circular field. If a man undertakes to cross the field in the dark, what is the chance that he will walk into the pond? [From *Byerly's Integral Calculus*.

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